

REMARKS

Overview of the Office Action

Claims 1, 2, 4, and 8 have been rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent Appl. Pub. No.: 2002/0154690 (Okazaki) in view of U.S. Patent Appl. Pub. No.: 2002/0181576 (Kennedy), and further in view of U.S. Patent App. Pub. No.: 2004/0062279 (Primrose).

Claim 6 has been rejected under 35 U.S.C. §103(a) as unpatentable over Okazaki, Kennedy, and Primrose, and further in view of U.S. Patent No.: 6,813,325 ("Lin").

Claim 3 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Okazaki, Kennedy, and Primrose, and further in view of U.S. Patent No. 7,027,499 ("Peon").

Claim 7 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Okazaki, Kennedy, and Primrose, and further in view of U.S. Patent No. 5,909,466 ("Labat").

Status of the claims

Claims 5, 9, and 10 have been previously canceled.

Claims 1-4 and 6-8 remain pending.

Interview Summary

Applicants' agent conducted a telephone interview with the Examiner on June 23, 2009. In the interview, Applicants' agent presented arguments to the Examiner regarding why one skilled in the art would not be motivated to combine Okazaki, Kennedy, and Primrose.

Specifically, it was pointed out that the entire device shown in Fig. 4 of Okazaki and described in the paragraphs [0060]-[0063] is a blind equalizer and that the element 202 cited by

the Examiner is an adaptive equalizer, which is only a part of the entire blind equalizer, and not the blind equalizer itself. It was also pointed out that Okazaki teaches using a particular channel impulse response (CIR) fixed initial value to prevent a timing slip internal to the blind equalizer, and that a timing slip at the output of the blind equalizer of Fig. 4 does not occur. Lastly, it was pointed out that since Okazaki teaches a blind equalizer that does not produce a time slip at its output, one skilled in the art would have no reason to alter the device of Okazaki, or combine Okazaki with the teachings of Kennedy and Primrose to address the technical problem of correcting a time slip at the output of blind equalizer.

The Examiner agreed with Applicants' arguments and requested that the arguments be formally presented in a written response to the Office Action.

Rejection of claims 1, 2, 4, and 8 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, and Primrose teaches all of Applicants' recited elements.

Independent claim 1 recites a method for synchronizing symbols at an output of a blind equalizer that includes "on sending, inserting into a succession of sent symbols, one or more known synchronization sequences of symbols repeated at regular intervals in said succession of symbols", and "retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, the number of symbols added or eliminated corresponding to the deduced shift of the symbols", which Okazaki, Kennedy, and Primrose, whether taken alone or in combination, fail to teach or suggest, because the

combination of Okazaki, Kennedy, and Primrose is improper and because the combination fails to disclose, teach or suggest retiming the symbols at the output of a blind equalizer as a function of the deduced shift of the symbols.

Applicants' recited method performs synchronizations of symbols by modifying the content of the succession of symbols at the output of a blind equalizer.

According to Applicants' recited method, successions of symbols $d(n)$ are sent over a transmission channel (see Fig. 1 of Applicants' specification). At the output of this transmission channel, the resulting symbols $r(n)$ are received and processed in a receiver that includes a blind equalizer 1, which receives at its input the symbols $r(n)$, and processor means 2 which processes the data $y(n)$ at the output of the equalizer 1 to limit the effect thereon of the loss of timing phenomenon (see paragraph [0033] and Fig. 2 of Applicants' specification).

The processing effected by the processor means 2 includes detecting, in the frames of symbols at the output of the blind equalizer 1, known synchronization sequences SYNCH previously inserted into the frames of symbols $d(n)$ at regular intervals, deducing any shift in the symbols processed by the equalizer 1, such as by detecting a shift in the known synchronization sequences, and retiming the data at the output of the equalizer as a function of the deduced shift by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer between a synchronization sequence for which a shift is detected and a preceding synchronization sequence. The number of symbols added or eliminated corresponds to the deduced shift of the symbols (see paragraphs [0034]-[0046] and Figs. 3a-3c of Applicants' specification).

The above-described recited features enable easy monitoring of the synchronization of a succession of symbols and rapid detection of a loss of timing phenomenon. Moreover,

Applicants' recited invention enables effective correction of this loss of timing by having a retiming adapted to the shift detected.

The Examiner concedes that Okazaki fails to teach or suggest, "on sending, inserting into a succession of sent symbols, one or more known synchronization sequences of symbols repeated at regular intervals in said succession of symbols", and "retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, the number of symbols added or eliminated corresponding to the deduced shift of the symbols", as expressly recited in independent claim 1.

The Examiner, however, cites the adaptive equalizer 22 of Fig. 4 of Okazaki as corresponding to Applicants' recited blind equalizer, and cites paragraphs [0005], [0015], [0060]-[0063], [0068], and [0072]-[0073] of Okazaki as teaching retiming the symbols at the output of the blind equalizer as a function of the deduced shift of the symbols between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence.

As discussed above, the entire device (i.e., all the elements 100, 202, 101, 204 together) shown in Fig. 4 of Okazaki and described in the paragraphs [0060]-[0063] form a blind equalizer (in particular see paragraph [0060] lines 3-4 of Okazaki). The element 202 cited by the Examiner is an adaptive equalizer, which is only a part of the entire blind equalizer of Fig. 4, and not the blind equalizer itself.

Okazaki teaches using a particular channel impulse response (CIR) fixed initial value to prevent a timing slip internal to the blind equalizer, so that a timing slip at the output of the blind equalizer of Fig. 4 does not occur (see paragraphs [0066], [0068], and [0070] of Okazaki).

Thus, Okazaki has nothing to do with addressing a time slip occurring at the output of a blind equalizer, as does Applicants' recited invention. Instead, Okazaki is concerned with addressing time slips internal to the blind equalizer so that there is no time slip at the output of the blind equalizer.

Consequently, the output of the blind equalizer of Okazaki does not need to be retimed in any way, for any reason. Hence, Okazaki fails to teach or suggest retiming the symbols at the output of the blind equalizer as a function of the deducted shift of the symbols between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, as recited in Applicants' claim 1.

The Examiner cites paragraphs [0027]-[0029] of Kennedy as teaching inserting into a succession of sent symbols, one or more known synchronization sequences of symbols repeated at regular intervals in said succession of symbols.

Kennedy discloses an equalizer that equalizes only a magnitude of a received wireless signal without regard to phase distortions introduced, and transmits the magnitude equalized signal to a timing recovery loop for improved correlation peak detection in a sync based timing recovery scheme. A channel equalizer receiving the output signal from the timing recovery loop equalizes the signal and corrects any phase distortions introduced by the magnitude only equalizer. The magnitude only equalizer of Kennedy includes at least one filter utilizing only real coefficients and constrained such that the direct term of the overall filter structure within the magnitude only equalizer is unity (see Abstract of Kennedy). To demonstrate the resulting improvement Kennedy describes simulation results obtained by using a 4-bit synchronization sequence SYNC each 832 signals (see paragraph [0027] of Kennedy).

Since Kennedy relates to equalizing a magnitude of a signal, Kennedy is not concerned

with, and does not address, the loss of timing issue at the output of a blind equalizer.

Consequently, Kennedy also fails to teach or suggest “retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, the number of symbols added or eliminated corresponding to the deduced shift of the symbols”, as recited in Applicants’ claim 1.

The Examiner cites Figs. 7 and 8, and paragraphs [0061]-[0063] of Primrose as teaching a deduced shift of the bits by eliminating bits from or adding bits to the succession of bits at a receiver, wherein the number of bits added or eliminated correspond to the deduced shift of the bits.

Primrose is concerned with data synchronization and proposes a two-stage method that involves synchronizing a signal received at a bit level, and synchronizing the received signal at a frame level (see paragraphs [0041]-[0042] of Primrose).

For the frame synchronization, Primrose proposes inserting a predetermined word (frame word) in the transmitted data sequence, and searching for the frame word, at the receiver side, between minimum and maximum limits evaluated as a function of an estimated propagation delay between the transmitter and the receiver (see paragraphs [0057], [0058], and [0063] of Primrose). Once a bit slip is identified, padding bits are added to the received signal to provide a frame aligned signal that is to synchronize the received signal for processing (see paragraph [0063] of Primrose). According to Primrose, the disclosed method enables a data flow rate that is greater than a data flow rate determined by existing system clocks to be achieved by the system (see paragraph [0064] of Primrose).

Primrose is not at all concerned with addressing the technical problem of a loss of timing at the output of a blind equalizer. Primrose is also not at all concerned with addressing the technical problem of a loss of timing induced by the use of adaptive blind equalizers in a multipath environment, and which results in either output timing lags or output timing leads in the reproduction of symbols.

Further, Primrose fails to teach or suggest retiming of symbols at the output of a blind equalizer as a function of the deduced shifts of the symbols, by eliminating symbols from, or adding symbols to, the succession of symbols at the output of the blind equalizer between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence.

Since Okazaki, Kennedy, and Primrose are each not at all concerned with addressing the technical problem of timing loss at the output of a blind equalizer, a person with ordinary skill in the art would not be motivated to look to any of these references, or combine these references to obtain a blind equalizer output synchronization solution to apply to a output of blind equalizer, as recited in Applicants' claim 1.

More importantly, since Okazaki teaches a blind equalizer that does not produce a time slip at its output, one skilled in the art would have no reason whatsoever to alter the device of Okazaki, or combine the teachings of Okazaki with the teachings of Kennedy and Primrose to address the technical problem of correcting a time slip at the output of a blind equalizer.

In view of the foregoing, Applicants submit that Okazaki, Kennedy, and Primrose, whether taken alone or in combination, fail to teach or suggest the synchronization method recited in amended claim 1. Accordingly, amended claim 1 is patentable over Okazaki, Kennedy, and Primrose under 35 U.S.C. §103(a).

Independent claim 8 recites limitations similar to independent claim 1 and is, therefore, patentable over Okazaki, Kennedy, and Primrose for reasons discussed above with respect to independent claim 1.

Claim 2 and 4, which depend from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Okazaki, Kennedy, and Primrose for at least those reasons discussed above with respect to independent claim 1.

Rejection of claim 6 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, Primrose, and Lin teaches all of Applicants' recited elements.

As previously discussed, Okazaki, Kennedy, and Primrose fail teach or suggest the subject matter recited in Applicants' amended independent claim 1.

Because Okazaki, Kennedy, and Primrose fail to teach or suggest the subject matter recited in amended independent claim 1, and because Lin fails to teach or suggest the elements of claim 1 that Okazaki, Kennedy, and Primrose are missing, the addition of Lin fails to remedy the above-described deficiencies of Okazaki, Kennedy, and Primrose.

Claim 6, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Okazaki, Kennedy, Primrose, and Lin for at least those reasons discussed above with respect to independent claim 1.

Rejection of claim 3 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, Primrose, and Peon teaches all of Applicants' recited elements.

As previously discussed, Okazaki, Kennedy, and Primrose do not teach or suggest the subject matter recited in Applicants' amended independent claim 1.

Because Okazaki, Kennedy, and Primrose fail to teach or suggest the subject matter recited in amended independent claim 1, and because Peon fails to teach or suggest the elements of claim 1 that Okazaki, Kennedy, and Primrose are missing, the addition of Peon fails to remedy the above-described deficiencies of Okazaki, Kennedy, and Primrose.

Claim 3, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Okazaki, Kennedy, Primrose, and Peon for at least those reasons discussed above with respect to independent claim 1.

Rejection of claim 7 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, Primrose, and Labat teaches all of Applicants' recited elements.

As previously discussed, Okazaki, Kennedy, and Primrose fail teach or suggest the subject matter recited in Applicants' amended independent claim 1.

Because Okazaki, Kennedy, and Primrose fail to teach or suggest the subject matter recited in amended independent claim 1, and because Labat fails to teach or suggest the elements of claim 1 that Okazaki, Kennedy, and Primrose are missing, the addition of Labat fails to remedy the above-described deficiencies of Okazaki, Kennedy, and Primrose.

Claim 7, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Okazaki, Kennedy, Primrose, and Labat for at least those reasons discussed above with respect to independent claim 1.

Conclusion

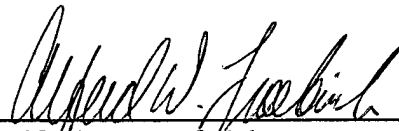
In view of the foregoing, reconsideration, withdrawal of all rejections, and allowance of all pending claims, are respectfully solicited.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
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